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Complications of Extrapleural Pneumothorax.—Complications developing in a series of 21 cases of extrapleural pneumothorax are reported. Some of them may follow any operation on a tuberculous patient, while others are the result of this operation in particular. The immediate postoperative mortality rate is low, but the potential complications are far more serious than those of thoracoplasty. Although adequate postoperative collapse was obtained in all, partial reëxpansion of the lung occurred in 7 patients from one to eight months after the operation. Violent uncontrollable cough was an important cause of this. Contralateral spread occurred in 6 patients ranging from immediately postoperatively in one, subsequently clearing, to thirteen months after operation. Air embolism occurred in one patient three days after operation, and haemorrhage into the pleural space occurred in another during the first week. There were 2 cases of acute intestinal tuberculosis. One of these patients died, while the condition of the other improved following the institution of a contralateral pneumothorax. In 7 patients, the fluid in the extrapleural space contained tubercle bacilli. There were 4 patients who developed bronchopleural fistulae, one of them developing within the first month postoperatively with rupture of the lung and extensive spread. In all these cases the operation had been difficult. When bronchopleural fistula develops the space should be treated as a large pulmonary cavity rather than as a mixed infection empyema and thoracoplasty is indicated. Thoracoplasty should be done in most cases of extrapleural pneumothorax as soon as the patient's condition warrants, thus eliminating potentially dangerous dead space; thoracoplasty appears to be well tolerated over this space. Of 8 thoracoplasties performed in this series only 2 have not done well. Submuscular abscesses were present in both of these, and in one of them the abscess communicated with the extrapleural space. The operation of extrapleural pneumothorax becomes increasingly difficult and hazardous as the duration of the disease increases.—*Complications of Extrapleural Pneumothorax, W. F. Hoyt & J. C. Tate, J. Thoracic Surg., June, 1941, 10: 551.*—(*D. G. F.*)

Combination Collapse Therapy.—Critical observation of the results of the conventional thoracoplasties done for closure of tuberculous cavities has demonstrated the limitations and disadvantages of these operations. The limited range of applicability is an important factor. Patients subjected to thoracoplasty should be in good general condition, free from complicating disease and essentially asymptomatic. The tuberculous process should preferably be unilateral, well stabilized, or actually retrogressive. In such a selected group, the mortality is approximately 6 per cent if the operation is carried out in stages. Half the patients become sputum-negative, and 64 per cent are alive at the end of six years, according to the world wide survey by Bull in 1930. [More recent and more favorable statistics on thoracoplastics are, of course, available. Ed.] All operations now in use are essentially unphysiological, because they

create conditions under which the cardio-respiratory system must work at a disadvantage. The serious consequences of removal of the bony support of the thoracic organs are paradoxical respiration, pendulum respiration and mediastinal flutter. These mechanisms result in disturbances of the circulation, heart failure, respiratory insufficiency, bronchogenic aspiration with spread of the tuberculous process and ultimately death. Exacerbation of lesions postoperatively is relatively frequent, even in cases where the lesions were thought to be well stabilized. Sputum retention due to postoperative pain and exacerbation of contralateral lesions due to autotuberculinization are frequent complications. These considerations have led the author to search for a collapse method which is safer and more efficient than the operations now in use. The operative procedure involves four separate factors, each of which in itself is insufficient for good collapse. It is the combination of four different procedures which fashions a new bony cage for the thoracic viscera and permits optimum collapse without loss of bony support. The four factors involved are: (*1*) resection of the paravertebral subscapular portions of the first four or five ribs, (*2*) transposition of the scapula into the thorax, (*3*) resection of the upper six intercostal nerves, and (*4*) basal extrapleural pneumonolysis. Resection of the subscapular segments of the first four ribs permits the transposition of the scapula into the thoracic cage without danger of it becoming unduly fixed in this position. The scapula then overlies the inner aspect of the fifth rib and by pivoting on it forwards eliminates the triangular dead-space formed by the mediastinum, the clavicle and the scapula. Most cavities are found in just this region, and elimination of the dead-space is of prime importance. In the ordinary thoracoplasty this space is filled postoperatively by blood, serum and air. It is usual to see a good collapse immediately following operation, but as soon as the extrapleural fluid and air are resorbed the lung reëxpands and again fills the dead-space. This is encouraged by the fact that in the usual apical or upper-stage thoracoplasty the scapula remains outside the chest cage. The question of how much of each rib is to be removed is settled on an individual basis. If the condition of the patient is only fair, the minimum amount that permits transposition of the scapula without danger of fixation is removed. If the patient's condition is good, maximum segments are resected. The limits are as follows: 6 to 8 cm. of the first rib, 12 to 17 cm. of the second rib, 14 to 20 cm. of the third rib, and 14 to 21 cm. of the fourth rib. The periosteum is always treated with 10 per cent formalin to avoid regeneration. This last step is an important feature of the operation, because it is felt that newly formed bone frequently attaches itself to the intact lower ribs and interferes with proper ventilation of the lung base. In the ordinary thoracoplasty bone regeneration is essential to provide protection for the thoracic viscera. Since no part of the chest is left without support in this operation, bone regeneration is unnecessary and even harmful. The upper six intercostal nerves are resected for several reasons. Neuralgia due to pressure of the scapula on the fifth rib and nerve is avoided. The upper rib segments have to be paralyzed so that no stress in the oppositive direction is put on the diseased lung when the patient coughs. The postoperative course is more nearly painless, thus eliminating one of the important factors in sputum retention. Finally, the anterior rib segments show a better tendency to curve backwards and inwards in claw-like fashion if the nerves are resected. This approximates the anterior bony shield even more closely to the scapula. The extent of the basal extrapleural pneumonolysis pocket is adapted to the individual case. The pocket fills with blood and serum postoperatively and the immediate large collapse is, of course, not permanent. However, the lung never reëxpands to the preoperative size because the resorption of the exudate is accompanied by shrinkage of the lung. This is yet enhanced by the paralysis of the anterior chest wall which sinks in posteriorly as progressive shrinkage takes place. Dangerous

bleeding necessitating transfusion has never been encountered in creating the extrapleural pocket and there was no instance of infection of the space. The operation is carried out in two stages. The first or preliminary stage is done in this order: resection of the sixth and fifth intercostal nerves, resection of the fourth and third rib, resection of the fourth and third intercostal nerves and formalinization of the periosteum of the resected ribs. The second or main stage is carried out as soon after the first stage as the patient's condition permits. The second and first ribs are resected, the periosteum is formalinized, the second and first intercostal nerves are resected, the basal extrapleural pocket is created and the scapula is put into the thorax. Whether or not to resect five ribs instead of four depends on the individual case. In general, resection of only four ribs is sufficient and more desirable, except in patients whose occupation demands absolutely perfect use of the arm, for example, in violinists. The considerations guiding the surgeon in creation of the pneumonolysis pocket are as follows: a small pocket is fashioned if the disease is strictly apical and the pocket is only necessary to accommodate the scapula, if the disease is bilateral and too large a collapse of one lung is not desirable, if the other lung is severely damaged from previous disease, or if bilateral collapse therapy is employed. A complete basal pocket, reaching to the diaphragm and the heart border, is used if there is basal involvement, especially in the form of bronchiectasis, if the cavity is in the paravertebral, the parasternal, or in the medistinal (medial) dead-space, if the entire lung is involved in a cavitary or pneumonic process, or if a residual empyema cavity is to be treated. This new combination operation may be used in conjunction with other collapse measures, such as phrenic crush or Monaldi drainage. The latter procedure may be done preoperatively to reduce the size of cavities or postoperatively to take care of residual cavities. The operation has also been successfully employed after ineffective paraffin plombage and extrapleural pneumothorax. The cosmetic results are uniformly good, because the vertebral margin of the scapula supports the thoracic spine effectively. Analysis of the successful cases shows that the operation is well tolerated by the older age groups and that there are very few absolute contraindications. The favorable results are due to the sound physiological principles employed. To date, the author has employed the operation in 45 cases with but one death. It is not stated, however, how many cases have been successfully operated on with sputum conversion and arrest of their disease. In the 18 cases illustrated the results have been excellent.—*Eine kombinierte Lungenkollapsmethode zur Kavernenbehandlung, G. Maurer, Helvet. med. acta, Ninth Supplement, 1942.*—(*H. M.*)

Thoracoplasty.—A series of 150 cases treated by thoracoplasty between 1932 and November, 1941 is analyzed. On these patients 347 operations were done; 46.7 per cent of the patients were much improved, 22.7 per cent were improved. In 39.3 per cent the sputum became negative for tubercle bacilli. The mortality was 9.3 per cent within the first postoperative week, 14 per cent within the first two months. The results are the same in men and women and are the same for right and left side. Pneumothorax and phrenic operation preliminary to thoracoplasty showed no influence on the results. Contralateral disease is no contraindication for thoracoplasty if the contralateral lesions are not too extensive or can be treated by collapse therapy. The need for closer coöperation between sanatoria, hospitals, clinics and central institutions dealing with patients requiring thoracoplasty treatment is stressed.—*Thoracoplasty in the Treatment of Pulmonary Tuberculosis: An Analysis of 150 Cases, P. V. Benjamin, Indian M. Gaz., October, 1942, 77: 581.*—(*G. C. L.*)

Bilateral Thoracoplasty.—Bilateral thoracoplasties were performed on 10 patients between 1938 and 1941. The operations were done in local anaesthesia. The interval be-

tween the operation on one side and on the other side was three to six months. Indications for operation were: (*1*) bilateral apical and subclavicular infiltration with much productive element in the lesion; (*2*) good respiratory reserve; (*3*) good general condition of the patient. All patients were discharged as arrested. Five case reports are presented.—*Bilateral Thoracoplasty: Report of 10 Patients Treated in the Wanless Tuberculosis Sanatorium, G. Samuel, Indian M. Gaz., October, 1942, 77: 603.*—(*G. C. L.*)

Bilateral Collapse Therapy.—A study was made of 34 cases of pulmonary tuberculosis treated with bilateral surgical collapse. The disease was far advanced in 23 patients (67.6 per cent) and moderately advanced in 11 (32.4 per cent). Several factors were considered with regard to the indication for bilateral collapse therapy and the choice of procedure to be used. The more involved lung was always considered for initial collapse especially if pneumothorax could be employed. Stationary or retrogressive disease gave the best final results; unless minor measures were successful, bilateral collapse was not usually used when the disease was progressive. That type of collapse was chosen which was felt to be at the same time efficient and capable of preserving the maximum amount of pulmonary function. Revocable minor procedures such as pneumothorax, took precedence over major permanent procedures; conditions seldom warrant bilateral thoracoplasty. Pneumothorax was tried in all cases before other procedures were considered. Phrenic nerve interruption was the next procedure chosen whenever possible. In a selected few cases with apical cavitation, extrapleural pneumothorax offered an alternative to permanent collapse. However, extrapleural pneumonolysis with paraffin pack was felt to be essentially the same operation with the additional advantages of producing a more localized collapse and thus preserving more functioning lung tissue, eliminating the need for repeated refills and at the same time being a revocable procedure since the paraffin pack can be readily removed. Where a gradual collapse was necessary, this was best achieved by an easy stage thoracoplasty, sometimes in combination with extrapleural apicolysis. Bilateral thoracoplasty was performed in one patient, now arrested. An initial thoracoplasty, followed by paraffin pack on the contralateral side, was performed in 8 patients. Of these, one is apparently cured, 4 are arrested or apparently arrested, 2 are improved and one shows no improvement. Bilateral extrapleural pneumonolysis with paraffin pack was performed in 3 patients, 2 of whom are now arrested and one quiescent. Thoracoplasty followed by extrapleural pneumothorax on the opposite side was done in one patient, now quiescent. Intrapleural pneumothorax followed by thoracoplasty on the contralateral side was done in 10 patients. One patient is apparently cured, 3 are arrested, 2 are considered quiescent and 4 are improved. Pneumothorax followed by paraffin pack on the opposite side was performed in 10 patients, 6 of whom are arrested, 5 at home and 3 improved. One of these patients died postoperatively of haemorrhage into the area of the pack. Permanent phrenic crush followed by thoracoplasty on the other side was done in one patient, now arrested. In the entire series 19 patients (55.9 per cent) are apparently arrested, arrested, or apparently cured, and 6 of these (17.6 per cent) are able to work. Improvement as a result of the bilateral collapse was noted in 94.2 per cent. The sputum is negative in 27 (79.4 per cent). Bilateral pulmonary collapse by major surgical measures is felt to be a useful procedure. —*The Bilateral Surgical Collapse of Pulmonary Tuberculosis, H. Meltzer, J. Thoracic Surg., December, 1941, 11: 227.*—(*D. G. F.*)

Lung Changes following Thoracoplasty.—A study was made of 134 autopsies on patients who had undergone thoracoplasty for pulmonary tuberculosis. The group included 86 males and 48 females. The duration of the disease varied from six months to sixteen years, 57 of the patients having a history of less than two years' duration and 77 having a

history of more than two years. Survival time varied from immediately following the operation to five years; 41 patients died during the first week and 20 lived for more than a year; 17 patients received no active treatment before the operation and in 37 thoracoplasty was done after failure to establish artificial pneumothorax. In 3 patients a phrenicectomy preceded the thoracoplasty and in the remaining 77 pneumothorax had been induced. Of these last 77 cases, 49 were complicated by empyema and 21 of these had bronchopleural fistulae as well. Lung changes following thoracoplasty were found to be dependent upon the extent and duration of the pulmonary disease prior to operation, the duration of the preëxisting lung compression, the extensiveness of the thoracoplasty and the length of life following it. The pleurae beneath the thoracoplasty scar were markedly thickened, the thickness being greater over the apical portion of the upper lobe. In 2 cases tuberculous foci were found in the pleurae in the absence of empyema. The tuberculous cavity was found closed in 17 of the cases, 11 of these having healed before the thoracoplasty was done. In 6 patients the closure of the cavity left a fibrous scar; in the others healing occurred by the inspissation of the caseous contents within the lumen. This latter form of healing is the type most frequently observed in the treated and untreated cases seen at autopsy. It has been found that in the closed healing of cavities closure of the draining bronchi is always associated with cavity closure. In 117 cases the cavity on the operated side was open and the draining bronchi patent. The cavities were usually irregular and in a number of cases were flattened in the mediolateral direction with their walls approximated. Such cavities may appear obliterated in the roentgenograms. The thickness of the cavity wall depends upon the organization into fibrous tissue of the perifocal inflammation around the vascular granulation tissue. This is the result of interference with the circulatory and bronchial systems caused by the compression. Partial epithelialization was noted in 4 cavities. The compressed lung contained encapsulated caseous foci in almost every case. These foci resulted from the healing of areas of caseous lobular pneumonia as was shown by intact elastic fibres in areas of caseation. The capsules around these foci were wider than around similar foci of the same age in non-collapsed lungs. Bronchiectasis, a complication of healing in chronic tuberculosis, was noted in 37 cases. In the upper lobes dilated bronchi were situated chiefly in the anterior or posterior portions or both. The bronchi generally revealed no evidence of tuberculous changes nor was there any secondary infection in the dilated bronchi. The pulmonary artery in the diseased portions of the lung showed intimal thickening of varying degree. On the collapsed side there is a marked decrease in the blood supply caused by the compression of the blood vessels which can be demonstrated by the fact that in a generalized haematogenous dissemination the noncompressed lung may show an extensive seeding while the collapsed lung shows little or none. The changes in the intervening lung tissue are dependent upon the extent of the underlying pulmonary disease at the time of compression rather than on the degree or duration of the collapse; the extent of the fibrosis depends upon the perifocal inflammation present around the caseous foci entrapped by the compression. Of 118 patients with unilateral thoracoplasty in whom there was no cavity in the opposite lung at the time of operation, 46 showed a spread to the opposite side. Of these, 5 died within the first week and the remaining 41 from a month to four years after the operation. It is felt, as a result of this relatively small number of fatal cases, that compression therapy prevents or diminishes the chances of spread to the opposite lung. In 62 cases the tuberculous process in the opposite lung showed evidence of healing; this was indirectly aided by the prevention of further spread as the result of the collapse therapy. Emphysema was present in the contralateral lung in all cases.—*Anatomic Changes in the Lungs following Thoracoplasty: A Study of*

134 Autopsy Cases, O. Auerbach, J. Thoracic Surg., October, 1941, 11: 21.—(D. G. F.)

Transpleural Decompression of Cavities.—It has been shown that some cavities enlarge following compression therapy, the chief factor in these cases being disease of the draining bronchi. The formation of a cavity in an elastic lung requires a disturbance in the integrity of the lung tissue (a caseous focus) and bronchial stenosis, both of these factors being necessary as a rule. A caseous focus alone will probably be discharged, the surrounding lung shrinking as a result of its elastic character. An efficient valve mechanism can be produced by inflammation of the draining bronchi, however, and this probably occurs frequently. These bronchial changes may be caused by allergic inflammation which has been observed bronchoscopically; bronchial changes capable of producing stenosis have also been seen histologically. The occasional disappearance of cavities following reëxpansion of lungs that have been adequately collapsed without effect is believed due to the subsidence of allergic inflammation during the collapse with resultant free passage of air to and from the cavity after expansion. The authors have observed 14 such cases. The large percentage of cavities remaining closed after aspiration by constant suction suggests the operation of a similar mechanism or at least suggests a condition capable of being reversed by aspiration. Examination of bronchi leading from cavities in 100 autopsied cases of tuberculosis revealed fibrotic and ulcerative bronchial lesions, but these lesions are of course irreversible; allergic phenomena were rarely seen since cases with high degrees of allergy rarely die in the early stages of cavity formation. Kymographic studies of intracavitary pressures during transpleural decompression show that in tension cavities very little air flows in and out through the communicating bronchus. Respiratory pressure fluctuations are caused by pressures transmitted through the cavity walls from the surrounding lung. Valve formation in these cavities is usually 100 per cent effective in the cavity to bronchus direction, and intracavitary pressures may be positive in both phases of respiration. This valvular efficiency can be shown to change during transpleural decompression therapy. In nontension cavities. pressures simulate normal bronchial pressures, air flows in and out with each respiration and there is no demonstrable valve mechanism. Transpleural decompression was tried on 18 patients; 2 patients had bilateral cavities. All these cavities were believed unsuitable for collapse therapy or this had been unsuccessfully attempted. Treatment was not completed in 7 patients. There were 3 deaths, 2 following tension pneumothorax and empyema. The cavities of 2 patients appear permanently closed and 5 patients have catheters still in place but the cavity secretions are negative for tubercle bacilli. The sputum and secretions of one patient who has had the catheter removed have been negative for bacilli for six months although the cavity is still seen to be open by X-ray examination. In 2 patients who had thoracoplasties performed after decompression was discontinued, the cavities are still open. Of 4 who had thoracoplasty before decompression, one is apparently cured. Transpleural decompression appears to be at least a partial answer to the demand for a new approach to the treatment of cavitation following the failure of compression therapy.—*Tuberculous Cavitation and Transpleural Decompression, H. Brunn, S. Shipman, A. Goldman & L. Ackerman, J. Thoracic Surg., June, 1941, 10: 485.—(D. G. F.)*

Treatment of Tuberculous Cavities.—The three widely used methods of treating cavities include collapse, compression and drainage, all postulated on different theories of cavity formation and healing. Collapse treatment presupposes that the cavity is kept distended by the pull of the chest wall; when the lung is freed of this, as by pneumothorax, it retracts due to its elasticity and the cavity collapses. Associated atelectasis also seems to be an important factor in the healing of the lung under these conditions. Some cavities, how-

ever, appear to be kept open by increased intracavitary pressure, and such cavities do not close even after adhesions are severed by pneumonolysis or thoracoplasty is done. Collapse operations should be most useful in open communicating cavities whereas collapse procedures should be used with hesitancy in those with high positive pressures, which retain lipiodol and other injected substances, or which change in size as air is introduced or withdrawn. Compression methods have for the most part fallen into disuse except as associated with extrapleural pneumothorax. Aspiration and suction drainage methods presuppose a cavity actively ballooned out from within, with the internal pressure higher than that of the surrounding lung most of the time. Studies of intracavitary pressure conditions were made in cadavers and in patients who were needled. It was found that in many tuberculous cavities the pressures varied as the communicating bronchus was open or blocked, and that even when the bronchi are fairly well open at times the intracavitary pressure is likely to be frequently above atmospheric. The cavity is kept distended by this pressure. Since the surrounding lung may impart pressure variations to the cavity contents, proof of a blocked communicating bronchus may be obtained by noting an elevated intracavitary pressure while the patient holds his breath with the glottis open. Needling cavities for the purpose of differentiating open ones amenable to various collapse procedures, as opposed to blocked ones which are not, is considered legitimate and useful provided that no pleural space exists. Thoracoplasty is likely to be unsuccessful in collapsing cavities with high intracavitary pressure, whereas such cavities may be closed temporarily by a single aspiration, or by continuous suction drainage if much pus is present. A secondary thoracoplasty or drainage with a skin flap is usually necessary to obliterate the cavity permanently, however. Needling may be used to determine whether adhesions or high intracavitary pressures are at fault when pneumothorax is ineffectual in collapsing a cavity, always provided that the pleural space is obliterated; cavities held distended by the former should change shape with respiration and with changes in position while those distended by the latter should not. Pneumonolysis should have no effect in the latter cases.—*The Choice of Procedure in the Treatment of Tuberculous Cavities: Considerations Regarding Intracavitary Pressure Based on Clinical Observations and Experiments on Cadavers, L. Eloesser, J. Thoracic Surg., June, 1941, 10: 501.*—(*D. G. F.*)

Vital Capacity.—The minimum time necessary for exhalation of a volume equal to the vital capacity was measured. By dividing the vital capacity by this minimum time the volume for the velocity of spirometric respiration was calculated. In addition to that the maximum expiratory pressure when exhaling into a manometer after having inhaled as deeply as possible was determined. In 30 healthy persons the vital capacity was in average 4,600 cc. The minimum time for exhaling the vital capacity was 3.4 seconds. The average expiratory pressure was 119 mm. No correlation existed between vital capacity and expiratory pressure. The respiratory velocity was in direct proportion to the vital capacity and to the expiratory pressure. The average values in 10 cardiac patients were: vital capacity 1,630 cc.; velocity of expiration 3.4 seconds; velocity of spirometric expiration 488 cc.; expiratory pressure 61 mm. No correlation existed between vital capacity, expiratory velocity and expiratory pressure. The respective values in 10 patients with pulmonary disease were: 1,580 cc.; 4.1 seconds; 412 cc.; 112 mm. The decrease in expiratory pressure in cases of cardiac insufficiency is explained by a diminution in the strength of the respiratory muscular apparatus.—*Investigations Concerning Vital Capacity, D. Gross, Am. Heart J., March, 1943, 25: 335.*—(*G. C. L.*)

New Pneumometer.—This instrument was designed to measure the maximal rate of flow of air during a maximal expiratory effort.

This maximal flow of air is expressed as volume of air exhaled per second, and it differs from the vital capacity and from the maximal expiratory pressure as previously measured. In beginning clinical emphysema or in bronchial asthma the vital capacity may still be normal, as may be the maximal expiratory pressure as measured by a simple mercury column, yet the rate of expiratory air flow may be considerably decreased. A healthy child, or an adult with pleural effusion or pneumothorax, may have a low vital capacity, but his rate of air expulsion may be identical with that of a normal adult. The new pneumometer operates on the following principle: When air is blown through a tube the diameter of which is narrowed in one place by the insertion of a perforated diaphragm, the air pressure behind the narrowing is lower than in front of it. The square root of this pressure difference varies directly with the rate of air flow. In applying this principle to the measurement of expiratory air flow, the perforation in the diaphragm must be wide enough to offer negligible resistance to the free flow of air. The rate of air flow is low at the beginning, it then attains its maximum value which is read on the instrument, and decreases again toward the end of expiration. Average values are 6 to 7 liters per second for the healthy adult male, and slightly lower for females. Values rise up to the age of twenty, and show a tendency to decrease after the age of forty-five. In pulmonary emphysema and bronchial asthma values of 2 to 3 liters per second are usually found, and even values of "practically 0" have been observed in these conditions.—*Ein neues Pneumometer zur Bestimmung des Expirationsstosses (maximale Ausatmungsstromstärke), W. Hadorn, Schweiz. med. Wchnschr., August 29, 1942, 72: 946.*—(*H. M.*)

Low Oxygen Tension in Experimental Tuberculosis.—The tubercle bacillus is an aerobic bacterium and the rate and luxuriousness of its growth *in vitro* is directly proportional to the oxygen tension of the gaseous environment. A reduction in the oxygen supply results in a proportional decrease in the bacterial respiration, the amount for optimum growth consisting of 14 volumes per cent of one atmosphere, which is approximately that of alveolar air. There are a number of circumstances which suggest that the oxygen supply may play an important rôle in determining the degree of multiplication of the bacilli within the body. For instance, one of the beneficial factors in therapeutic pneumothorax may be the reduction of the oxygen supply of the collapsed lung, since in a collapsed lung the normal replenishment of atmospheric air is reduced or prevented. Bacilli thrive far better in the gaseous tension of normal alveolar air than in that of venous blood. It has been shown experimentally and noted clinically that tuberculous mothers rarely give birth to tuberculous offspring. The oxygen supply to the tissues of the foetus is decidedly lower than that of the mother's body, and there are a number of considerations that suggest that the amount of available oxygen in the different tissues may play a rôle in determining the degree to which they are involved in tuberculosis. The decrease in the oxygen tension of the atmospheric air may be a factor in whatever beneficial effect high altitude may have in tuberculosis. Since other factors than oxygen supply may be responsible for the observed inhibition of the tuberculous process in the circumstances mentioned above, an attempt was made to determine whether the development of tuberculosis could be influenced by decreasing the oxygen supply. The effect of continuous exposure to low oxygen tension was studied. For this purpose a chamber, with glass windows, was constructed in which animals could be kept continuously at approximately any desirable oxygen tension, with no alteration of the atmospheric pressure. This was achieved by introducing the necessary amount of nitrogen to bring the concentration of oxygen in the sealed chamber down to the desired oxygen content. When this was obtained, the nitrogen reservoir was disconnected and an oxygen system connected so that the oxygen could be replenished as consumed. The carbon dioxide

given off by the animals was absorbed by soda lime and the environmental temperature was kept as constant as possible in order to avoid changes in the volume of gas in the chambers. Except in the first three experiments no attempt was made to absorb water vapor from the chamber. Nine experiments were carried out using 106 animals of which 13 were rabbits and 93 guinea pigs. In five experiments the oxygen content of the chamber was maintained at approximately 9 to 10 volumes per cent; in two experiments at approximately 12 volumes per cent; in one experiment at 13 to 14 volumes per cent; and in one experiment at 20 volumes per cent. In each experiment a group of animals were infected with equal and relatively large numbers of virulent tubercle bacilli. Half of the group were kept continuously in the chamber (except for the weekly cleaning and replenishment of food and soda lime), and the remaining half were kept as controls in open cages in the same room. Each experiment was terminated after a period of three or four weeks, all animals being killed and carefully examined to determine the amount of tuberculosis present. The examination included serial sections of representative portions of the spleen, liver, both lungs and bronchial lymph nodes. When a chamber animal died after three weeks sojourn in the apparatus, a control animal was killed for comparison. The animals were graded according to the results of the microscopic study. The results of these experiments show that in animals exposed to an oxygen content of 9 to 10 volumes per cent, the development of the infection was markedly inhibited in comparison to the controls kept in open cages in the same room. That this was due entirely to the low oxygen tension is indicated by the fact that the animals in the chamber kept at 20 volumes per cent showed the same amount of tuberculosis as the controls in the open cages. Furthermore, in the chamber in which the oxygen content was kept 12 to 14 per cent, the inhibitory effect of the diminished oxygen supply was small, for these animals showed almost as much tuberculosis as the controls. The present experiments support the view that low oxygen tension can be an important factor in the beneficial effect of collapse therapy in pulmonary tuberculosis and that the relative anoxaemia of the foetus is a factor in the resistance of the foetus to tuberculous infection. They offer, however, little support for the view that the decreased oxygen tension in the atmospheric air at high altitude resorts can inhibit significantly the activities of the tubercle bacillus—at least not at the altitude at which sanatoria are usually situated. An oxygen tension of 10 volumes per cent is equivalent to that in the atmosphere at 19,000 feet above sea level. The altitude of Davos, Switzerland, is only 5,300 feet. In conjunction with therapeutic pneumothorax, however, the low oxygen tension of high altitudes may be a supplementary factor in recovery. It must not be forgotten that the compensatory mechanisms of the body (increased heart action; compensatory polycythaemia) can neutralize the effect of the atmosphere deficiency. The degree to which these compensatory mechanisms operate in each individual body is important in determining the degree to which tissue anoxaemia will result from a given decrease in the atmospheric oxygen. In a few of the test animals, after two weeks in the chamber, the red cells were increased 30 per cent and the haemoglobin 16.5 per cent above normal. But this aspect of the experiment is not further reported on. It is interesting to note that, in the guinea pigs receiving the minimum amount of oxygen, the progress of the disease in the liver was restricted in as markedly a degree as in the rabbit, in which anoxaemia occurs spontaneously as a result of the more marked pulmonary involvement.—*The Effect of Low Oxygen Tension upon the Development of Experimental Tuberculosis, A. R. Rich & R. H. Follis, Jr., Bull. Johns Hopkins Hosp., December, 1942, 71: 345.*—(*J. S. W.*)

Modification of Tubercle Bacillus.—A human strain of tubercle bacilli (H-1) was modified in its cultural and pathogenic characteristics by gradually acclimating it to

growth on media containing diphtheria antitoxin. The morphology of the colony showed the modified organism to be a typical S variant of the parent strain. It became possible to grow this strain on potato glycerol blood agar which contained from 80 to 100 units of diphtheria antitoxin per cc. of medium. The variant strain had a markedly increased pathogenicity for laboratory animals in which it caused rapid death and extensive miliary tuberculosis.—*Modification of the Tubercle Bacillus Treated with Diphtheria Antitoxin, L. Gershenfeld & P. Schain, Quart. Bull. Sea View Hosp., October, 1942, 7: 400.*—(*A. A. E.*)

Electron Microscopy.—Representatives of several genera of bacteria including *Mycobacterium* were examined by means of the electron microscope. The cell wall of *Mycobacterium tuberculosis hominis* was observed to be very delicate and many minute, dark, discrete granules ranging from 70 to 230$\mu\mu$ in diameter were seen throughout the protoplasm and in particular adhering to the cell walls. Similar granules were found in organisms of the *Vibrio*, *Corynebacterium* and *Spirochaeta* groups. Dense areas of differing size, shape and position, not sharply circumscribed, were observed in cells of the typhoid bacillus and *Fusobacterium*.—*Bacterial Morphology as Shown by the Electron Microscope. IV. Structural Differentiation within the Bacterial Protoplasm, S. Mudd, K. Polevitzky & T. F. Anderson, Arch. Path., July, 1942, 34: 199.*—(*D. G. F.*)

Avirulent Tubercle Bacilli.—From observations gathered since 1918, in the course of a number of studies on the virulence of tubercle bacilli, the authors conclude that it appears likely that virulent tubercle bacilli from the patient with the usual active pulmonary tuberculosis might attain relative avirulence in their progeny. The question is also raised whether tuberculosis in the chronic prolonged case may not be predominantly one of chronic allergic intoxication rather than predominantly tuberculosis. An illustrative case history is presented of a patient who had tuberculosis from 1922 until his death in 1942. Guinea pig inoculation in 1923 proved the virulence of the infecting organism, while none of the cultures inoculated in 1941 proved pathogenic for guinea pig or rabbits when given intravenously in amounts as high as 1 mg. in fine suspension. Also presented are the results of a study of 8 patients with positive sputum and advanced tuberculosis of ten years or more duration. Cultures of tubercle bacilli isolated from their sputa were submitted to graded comparative virulence tests. Half of the strains from this series proved highly virulent, with survival of the guinea pig from sixteen to nineteen days, and half were classified as moderately virulent. The series is too small to draw general conclusions other than that the presence of tubercle bacilli in the sputum does not warrant deductions regarding their virulence without actual submission of the bacilli to graded virulence tests. For further suggested studies, the prognostic significance of the presence of tubercle bacilli in the sputum must be modified by three factors at all times: (*1*) specific immunity to tuberculosis, which cannot be gaged at present in the individual case; (*2*) the number of bacilli in the lungs, which may be approximated; (*3*) the virulence of the bacilli, which can be tested.—*The Presence of Relatively Avirulent Tubercle Bacilli: In Pulmonary Tuberculosis in Man, H. J. Corper & M. L. Cohn, J. A. M. A., October 10, 1942, 120: 427.*—(*G. L. L.*)

Media for Tubercle Bacilli.—Reported here are observations on the growth from very small inocula of human, bovine and avian tubercle bacilli on coagulated and on unheated egg-yolk media. The object was to find the best culture medium for the isolation of all types of tubercle bacilli from animal tissues. The media tested were coagulated egg-yolk (Corper's medium), unheated egg-yolk solidified with agar (Harrold's medium), and coagulated whole egg (Dorset's medium). A synthetic medium (Dorset's) was used for comparison. These same media were also

tested with the glycerine omitted. Selective media were not considered here since we happen to be concerned only with isolating tubercle bacilli from animal tissues, which can be freed from outer contaminants. For isolation of tubercle bacilli from either human or animal sources the culture medium should be one which will support the growth of small inocula of all three types of tubercle bacilli. Egg-yolk media without glycerine are satisfactory for this purpose. If the same medium with and without glycerine is used, growth on the nonglycerinated medium only is presumptive evidence that the organism is a bovine tubercle bacillus. None of the nutritive factors in the egg-yolk apparently is labile to heat because autoclaved egg-yolk medium is as good a medium as unheated egg-yolk agar. To be satisfactory egg-yolk media must be prepared so that there is sufficient concentration of oily substance at the surface of the slant; also the coagulated yolk medium must be sterilized so that it does not lose too much moisture; under our conditions autoclaving was much superior to inspissating. Egg-yolk media are superior to whole egg media for the isolation of human and bovine tubercle bacilli. Egg-yolk is not necessary for the initiation of growth by avian tubercle bacilli, but more growth is obtained on egg media than on a synthetic medium. Glycerine increases the growth of avian tubercle bacilli on egg-yolk or whole egg media, but not the growth of human tubercle bacilli on egg-yolk media.—*Egg Mediums for the Isolation of All Three Types of Tubercle Bacilli, J. R. McCarter & E. M. Kanne, J. Infect. Dis., September–October, 1942, 71: 102.*—(*F. G. P.*)

Growth of Tubercle Bacilli.—It has generally been believed that less than about 1.0 or 0.1 mg. tubercle bacilli would not grow in Long's medium if accessory factors were not added, that growth must necessarily take place on the surface and that, if a transplant of bacilli sank beneath the surface, growth failed to occur. Drea (1940) reported that amounts of H37 strain "at least as small as 10^{-6} mg." could be cultured in a slightly modified form of Long's medium. It seemed unnecessary to discuss the self-evident irregularities recorded in a table in that paper for growth from the 10^{-6} to and including 10^{-10} mg. plantings, since the series was a brief preliminary one, and no conclusions were drawn regarding growths with less than 10^{-6} mg. However, failure to discuss this point seems to have made the table appear misleading. Continuation of the research showed that growth of the H37 strain of human tubercle bacilli in Long's liquid synthetic medium can develop when amounts at least as small as 10^{-7} to 10^{-8} mg. are planted. Very small amounts of contaminating organic substances, hitherto unsuspected, are readily adsorbed by the glassware, and may act as growth inhibitors. The smallest amounts of these bacilli that will grow when such inhibitors are present vary from 10^{-2} to 10^{-6} mg. A soap, sodium oleate, will inhibit the growth of tubercle bacilli when present in something greater than 0.1 p.p.m. and less than 1.0 p.p.m. Soaps may be a part of the contaminating adsorbed films. Especially inhibiting to growth are the distillates from bleached, nonabsorbent cotton stoppers in the glassware. The elimination of inhibitory substances from a liquid synthetic medium will provide a valuable means of investigating: (*1*) accessory growth factors and (*2*) bacteriostatic and bacteriocidal properties of deliberately added agents in *in vitro* studies of tubercle bacilli. The elimination of inhibitory substances from culture media is of importance in the cultural studies of other microörganisms and it is probable that organic films including the distillates from cotton stoppers adsorbed on the glassware are inhibitory to the growth of small numbers of these organisms, especially in synthetic media which otherwise permit growth. This may also be of importance in virulence studies where small numbers of microörganisms are used.—*Growth of Small Numbers of Tubercle Bacilli, H37, in Long's Liquid Synthetic Medium and Some Interfering Factors, W. F. Drea, J. Bact., August, 1942, 44: 149.*—(*F. G. P.*)

Beading of Tubercle Bacillus.—Koch first described the beaded forms of the tubercle bacillus and regarded the beads as evidence of spore formation. Later investigators attempted to correlate the beaded forms with the age and the virulence of the microörganism. These studies, however, have not been fully confirmed. In the present paper, data are submitted to show that the beads exhibited by tubercle bacilli stained with carbol fuchsin are greatly influenced by the preparation of the dye used, by the presence of electrolytes in the system and by subsequent washing with alcohol and other organic solvents. Films prepared from the same suspension of tubercle bacilli and stained under the same conditions may present uniformly, solidly stained bacilli or bacilli exhibiting beads in varying number, depending on the preparation of carbol fuchsin used. Addition of small amounts of electrolytes to the dye solution greatly increases the number of beads with all dyes, even those which never produce any beads in the absence of salt. In preparations stained in the presence of salt, the bacilli often appear as chains of heavily stained purple bodies, larger than the diameter of the cell proper, whereas the body is stained only faintly pale pink. The production of beads is much decreased, even in the presence of salt, when the dyes are used in lower concentrations than is the usual practice. In all cases, washing of the stained preparations with neutral alcohol (following decolorization with acid alcohol) removes practically all the beads and leaves most of the bacillary bodies as evenly stained rods of a pink tinge. The effect of electrolytes and of alcohol on the production and destruction of the beads can be directly followed under the microscope in wet preparations. In addition to the types of beads described in the present study, there are, of course, the tiny granules seen in tubercle bacilli stained by the Ziehl-Neelsen technique, particularly noticeable in old cultures. These granules, unlike the typical beads, do not disappear when washed with neutral alcohol and appear, therefore, to be of a different nature.—*Factors Affecting the Beading of the Tubercle Bacillus Stained by the Ziehl-Neelsen Technique, D. Yegian & L. Baisden, J. Bact., December, 1942, 44: 667.*—(*F. G. P.*)

Standardization of Tuberculin.—Inoculation of guinea pigs with killed tubercle bacilli in liquid petrolatum produces satisfactory sensitization for standardization of tuberculin; 0.2 cc. (2 mg.) of suspension of heat killed human tubercle bacilli of strain Jamaica 22 is injected into each of 3 sites in back of the neck of a large guinea pig. The pigs become suitable for tuberculin standardization after one month and the sensitization is sustained at high level for at least six months. Advantages of this method include the elimination of tuberculous animals, repeated use of animals, greater uniformity of the sensitizing antigen and the convenience of keeping the antigen for a long time.—*Standardization of Tuberculin with the Aid of Guinea Pigs Sensitized by Killed Tubercle Bacilli in Liquid Petrolatum, J. Freund & R. Y. Gottschall, Arch. Path., July, 1942, 34: 73.*—(*D. G. F.*)

Levinson Test for Tuberculous Meningitis.—The Levinson test for tuberculous meningitis is a very accurate diagnostic procedure. A study of the literature and a personal survey of several hospitals and many physicians revealed that this test is little known and used still less. The technique of the test is as follows: Into each of two small test tubes of uniform width, about 0.3 cm. in diameter, place 1 cc. of spinal fluid. Add to one of the tubes 1 cc. of 3 per cent sulfosalicylic acid and to the other 1 cc. of 1 per cent mercuric chloride. Stopper the tubes and allow them to stand for from twenty-four to forty-eight hours at room temperature and then measure the height of the sediments. Normally, both are very small; in suppurative meningitis the sulfosalicylic precipitate is very heavy and the mercuric chloride precipitate is very small. In tuberculous meningitis the opposite takes place, the sulfosalicylic acid precipitate being small and the mercuric chloride precipitate being large. In order to read a

positive Levinson test the foregoing conditions must be fulfilled and the mercuric chloride precipitate must be from two to three times as great as the sulfosalicylic precipitate; that is, when measuring the height of the precipitate in the two tubes, diameters of which are the same, the height of the mercuric chloride precipitate must be two or three times as large as that of the sulfosalicylic acid. It is to be remembered that this test is only to be performed on clear spinal fluid. A total of 110 new cases and 107 cases in the literature were studied for the accuracy of the Levinson test. The authors' results revealed that this test is 94 per cent accurate, whereas the total of the authors' cases plus those of other investigators (who found 100 per cent accurate results) brings the percentage of accuracy up to 97. As this compares favorably with any other diagnostic procedure, and as the number of cases is not too small, the authors feel that this simple test should be used more often in the diagnosis of meningitis. It should be evident that the test is of value only in cases of meningitis where the spinal fluid is clear and where no serum has been administered, since pus, red blood cells and serum render the spinal fluid more alkaline and result in a false positive.—*Levinson Test for Tuberculous Meningitis. Presentation of 110 Cases and a Discussion of the Principle and Technique of the Test, D. Burman & R. Weintraub, J. Infect. Dis., November, 1942, 28: 213.*—(*F. G. P.*)

Funnel Chest Deformity.—Funnel chest deformity, variously known as *Trichterbrust, pectus excavatum,* koilosternia, chonechondrosternon, etc., is readily recognized on clinical examination and in lateral roentgenograms of the thorax. The condition can be recognized in the majority of instances in the conventional posteroanterior roentgenogram alone. Seven cases of this deformity have been studied roentgenologically and the following features as seen in the frontal projection of the chest are considered of value in its recognition: (*1*) sharp downward slanting of the anterior arcs of the ribs; in addition to the slant, the ribs, anteriorly, are usually straight; the degree of slant varies with the severity of the depression; (*2*) displacement of the cardiac shadow to the left with a tendency toward mitralization of its contour; (*3*) indistinct right cardiac border which becomes lost in the shadow of the spine; even when not displaced, the right border is difficult to see due to compression of the adjacent lung; (*4*) decreased density of the heart shadow with corresponding increased visibility of the spine; (*5*) cloudiness of the medial aspect of the right lung base; this is due to the increased mediastinal pleural space and to compression of the lung as a result of the depressed sternum; this may be sufficient to suggest atelectasis, pleural thickening or inflammatory consolidation.—*Funnel Chest Deformity and Its Recognition in Posteroanterior Roentgenograms of the Thorax, L. W. Paul & M. R. Richter, Am. J. Roentgenol., November, 1941, 46: 619.*—(*W. H. M.*)

Cor Pulmonale and Chest Deformity.—The case of a twenty-seven-year old woman who suffered from severe kyphoscoliosis since childhood is reported. Death was caused by right-sided cardiac hypertrophy and insufficiency secondary to the chest deformity. Attention is called to the part severe chest deformities may play in the development of right ventricular hypertrophy and failure.—*Right-Sided Heart Failure (Cor Pulmonale) Caused by Chest Deformity, A. J. Hertzog & W. R. Manz, Am. Heart J., March, 1943, 25: 399.*—(*G. C. L.*)

Remaining Lung after Pneumonectomy.—This is a continuation of work previously reported. Pneumonectomies were performed in a group of puppies and adult dogs and the animals were followed for a period of four years, being sacrificed at intervals. Measurement of intrapleural pressures in one pneumonectomized animal from both age groups after four years indicated some loss of elastic lung recoil, the pressures being somewhat closer to atmospheric with an average range of

only 3 cm. of water during the respiratory cycle. A control from the same litter as the pneumonectomized puppy still had the normal range of minus 5 to minus 9 cm. of water. After a two-hour run on a treadmill, the animal pneumonectomized as a puppy showed a considerable diminution in its ability to eliminate heat and to saturate the arterial blood compared with nearly perfect findings after a similar test performed three years before, nine months after operation. It did not, however, show the degree of exhaustion and collapse exhibited by the animal pneumonectomized as an adult. The control animal gave results comparable to its record of three years before. Determination of the critical oxygen level (indicated by the concentration of oxygen in the respired air at which consciousness is lost and respiration, but not heart action, ceases) revealed a value that for the younger pneumonectomized animal was somewhat higher and for the older animal was twice as great as it was three years previously. In the control animal, on the other hand, it was somewhat lower. The cardio-respiratory reserve in the animal pneumonectomized as an adult was thus one-half of what it was nine months after the operation, and less than half its value before pneumonectomy. Since the cardio-respiratory reserve is cut in half immediately following the operation due to the loss of half the functional diffusing surface of the lung, and since animals operated upon as adults show a recovery of 75 to 80 per cent nine to twelve months postoperatively (as shown in an earlier paper), it appears that the compensatory return of function is lost to a varying degree during the next three years, being minimal in young animals operated upon while the growth factor is still present in the lung. A histological study was made of the remaining lungs of 3 animals pneumonectomized as puppies two, three and almost four years before being sacrificed, 2 operated upon as adults two and almost four years before, and 2 normal control animals. In the first group there was a slight decrease in the average alveolar diameter (93 to 106 microns) as compared with 116 microns in the control for this age group. Since these lungs were almost twice normal size, these findings suggest that hyperplasia of respiratory units occurred. The atria, especially in the tissue beneath the pleura, were slightly enlarged, however, and occasional fragmentation of elastic tissue and broken alveolar walls were noted. In the adult group the average alveolar diameter was increased to 129 microns as compared with 106 in the control. Atria were distended and many alveolar walls were broken with thickening of, and clumping of elastic fibrils in the ruptured ends; there seemed to be some fragmentation of elastic tissue in many areas. These changes were more prominent in the animal sacrificed after four years than in the one killed earlier. From these histological and physiological findings it would appear that animals pneumonectomized as puppies create by hyperplasia and regeneration of respiratory units an adequate diffusing surface which is maintained with only a slight decrease until four years afterward. Older dogs, on the other hand, have only a partial restoration of functional surface due to compensatory emphysema with the onset, after a time, of a true chronic interstitial emphysema and resultant diminution in functional diffusing area, blood oxygenating ability and ability to withstand severe strain.—*An Experimental Study of the Fate of the Remaining Lung following Total Pneumonectomy, J. J. Longacre & R. Johansmann, J. Thoracic Surg., December, 1940, 10: 131.*—(*D. G. F.*)

Bronchoscopy in Pulmonary Abscess.—A study of 124 cases of pulmonary abscess is presented, the term being confined to a condition of nontuberculous, cavernous, pulmonary suppurative disease in which a single open cavity has been adequately demonstrated at the outset, although it may later have become multiple, multilocular or both. There were 83 male and 41 female cases. The cavities seemed to show a predilection for the right side, but there appeared to be no relation between their location and the ability of

the patient to survive. Some surgical procedure preceded the abscess in 49 cases, this being tonsillectomy in 36, while 46 cases had symptoms dating back to some respiratory incident such as grippe, the abscess possibly following occlusion of a small segmental bronchus with tenacious secretion or inflammatory change with resultant atelectasis. The remaining cases were apparently the result of such miscellaneous causes as trauma, foreign body, carcinoma, etc. Bacteriological study of aspirated secretions in 113 cases revealed that haemolytic staphylococci, haemolytic and nonhaemolytic streptococci, pneumococci and *N. catarrhalis* were characteristically found in aerobic and anaerobic cultures; proteolytic anaerobic organisms including spirochaetes were seen in pulmonary gangrene and putrid empyema. Average duration of symptoms was about eleven months but varied from four days to eleven years. The longer the process is present the higher is the incidence of complications and this affects the outcome of bronchoscopic treatment. The period over which conservative therapy can be employed must, however, be individualized. Bronchoscopy can be used prophylactically to remove obstruction and relieve atelectasis, thus preventing suppuration. In addition, it is a valuable diagnostic aid, and it may initiate and provide adequate drainage in the acute stage of pulmonary abscess (a period of four to six weeks). If there is no improvement, it permits the early use of more radical measures. When the abscess is treated surgically, bronchoscopy used pre- and postoperatively is of proved value, and when used during the operation may be lifesaving. A trial of conservative therapy with bronchoscopy is indicated in subacute and chronic abscesses, however, since a number of cases respond well to this treatment. Conservative therapy includes, besides bronchoscopic procedures, routine supportive care, postural drainage, transfusion, vaccines and intravenous therapy, such as neoarsphenamine. In 78 cases treated for an adequate time by this regimen alone there were 23 deaths, 33 known cures, 5 additional cures which were not followed up and 17 cases improved at discharge. Of 37 patients treated surgically, 18 died of various causes. Of 17 patients treated by methods other than external drainage only 4 survived, justifying the use of external drainage as the operation of choice, except where complications demand lobectomy or pneumonectomy. The most significant causes of death were diabetes, pulmonary gangrene, massive haemorrhage, complicating empyema and extensive pneumonitis. The solution to the problem of pulmonary abscess lies in the careful coördination of the medical and surgical regimen; bronchoscopy should be an integral part of both. Patients not showing satisfactory results with conservative therapy, or who show regression after initial improvement, should have prompt external drainage.—*The Rôle of Bronchoscopy in the Treatment of Pulmonary Abscess, C. L. Jackson & A. R. Judd, J. Thoracic Surg., December, 1940, 10: 179.*—(*D. G. F.*)

Bronchiectasis in Children.—The author believes that bronchoscopy, with bronchoscopic suction, the injection of iodized oil under general anaesthesia and bronchography, has proved of unquestioned benefit in the study and treatment of bronchiectasis in children. The instillation of iodized poppyseed oil under general anaesthesia (ether oxygen) is now regular practice at the Hospital for Sick Children, Toronto, and has resulted in the more frequent diagnosis of bronchiectasis and the less frequent labelling of the case as chronic bronchitis or unresolved bronchopneumonia. Sedatives are withheld before bronchoscopy. The tenacious secretion is carefully and thoroughly aspirated from the bronchial tree, and not until then is oil introduced into the desired area. The instillation is controlled by fluoroscopic visualization. The author presents the results of a study of 433 diagnosed cases of bronchiectasis over a period of thirteen years, 230 of which have been confirmed by bronchography. In the early years laryngeal oedema frequently followed the bronchoscopy,

requiring tracheotomy in 3 cases, but experience has taught the avoidance of this complication. Inadequate visualization of any part of the bronchial tree prevents the assertion that this area is normal. Abrupt blocking of a bronchus demands investigation of the area that lies beyond. Bronchography is contraindicated in babies under one year of age and in children with local bleeding areas. No definite aetiological relationship of bronchiectasis to sinusitis has made itself obvious. Lobectomy or pneumonectomy offers the only cure in cases of advanced bronchiectasis, and bronchography of both lungs is of great importance in the selection of cases for surgery. Lobectomy is contraindicated when the bronchial tree presents active ulcerations and granulations. Repeated bronchoscopic suction treatments frequently produce such freedom from symptoms that parents discontinue bringing the child for examinations, and many of these cases are clinically cured. However, the author lists as cured only those patients who have had the diseased lung removed surgically. In a certain percentage better emptying is obtained when oil is injected at the time of suction, and the patient can go for a longer period between treatments. Bronchoscopy is the most effective form of treatment of the large group which does not require major surgery.—*Bronchoscopy in the Diagnosis and Treatment of Bronchiectasis in Children, D. E. S. Wishart, J. A. M. A., December 12, 1942, 120: 1181.*—(*G. L. L.*)

Acute Respiratory Infections in Children.—The author has studied the paranasal sinuses and chests in children for many years and believes that a large percentage of all cases of chronic tracheobronchitis, bronchitis, bronchiectasis and peribronchitis are directly associated with chronic sinus disease. The sinuses and mastoids may be infected simultaneously with the bronchi and lungs, but too often only the chest is studied carefully. More frequent roentgen studies of the paranasal sinuses and mastoids are recommended. —*The Roentgenological Study of Acute Infections in the Respiratory Tract of Children, J. S. Bouslog, Am. J. Roentgenol., November, 1941, 46: 622.*—(*W. H. M.*)

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